BOTTLE STOPPER

Field of the Invention

The present invention concerns improvements in and relating to bottle stoppers such as are used for bottles of wine or the like.

Background to the Invention

The bottle stopper of wine bottles, commonly referred to as a cork because historically it has always been made of the resiliently-compressible bark of the cork tree, nowadays may be formed of a number of different materials and especially rubber or other elastomeric materials. The design of the bottle stopper needs to be such as to provide an effective seal between the interior of the bottle and the atmosphere in order to prevent spoilage of the wine or other beverage held within the bottle. Exposure to oxygen is a major concern since it leads to oxidation of the wine, a general consequence of which is that the wine becomes too acidic and unpalatable. The problem with the traditional cork bottle stopper is that it generally is very difficult to re-insert it into the bottle top once removed and consequently most consumers if opening a bottle of wine and not finishing it will either leave it unstoppered and, therefore, entirely vulnerable to oxidation, or will seek to stopper the bottle using a replacement for the stopper.

Whether the consumer has attempted to reclose the bottle or not, a part-emptied bottle will, of course, admit a substantial volume of air to oxidise the wine remaining in the bottle and thus the shelf-life of the wine remaining in the bottle is extremely short. A partial remedy for this, and one which is often perceived as being a good solution but which in practice is not, is to use a bottle-top mountable pump to evacuate the bottle through a sealable closure that acts as a one-way valve. By evacuating the air from within the bottle in this way the shelf-life of the half consumed bottle is extended by just a few days, if any.

Another partial remedy entails filling the void of the part-emptied bottle with an inert gas. This is, however, largely impractical. The seal over the wine or other beverage in the bottle is vulnerable to being broken by the slightest agitation of the bottle and

it is generally ineffective when the bottle is under half full. Sparkling wines cannot generally be preserved by this method.

For those consumers who do wish to store part-opened bottles of wine for any substantial length of time or wish to take more substantial measures to prevent oxidation occurring, the existing available products for the purpose do not meet the requirement.

It is amongst the objectives of the present invention to provide a bottle stopper suitable for use in wine bottles for resealing the wine bottles and optimising the extent of preservation of the remaining wine (or other oxidisable beverage - e.g. fruit juices or other).

Summary of the Invention

According to a first aspect of the present invention, there is provided a bottle stopper for a wine bottle or the like, which bottle stopper comprises a body having a sealing member which sits within the neck of the bottle in use and which extends radially outwardly to seal the bottle neck, the stopper further having a passageway extending upwardly therethrough to communicate with the interior of the bottle and which incorporates or communicates with a chamber within the stopper in which is housed an oxygen-scavenging medium, wherein the stopper further has a closure means to close the passageway and which is operable by actuator means that is external to the bottle in use to enable the user to open the passageway when the stopper is in place.

Preferably, the bottle stopper has a mechanism for compressing the sealing member substantially axially of the stopper to expand the sealing member laterally/substantially radially of the stopper into sealing contact with the neck of the bottle.

Particularly preferably the actuator for opening the closure means for the passageway is the same as or coupled to an actuator of the mechanism for compressing the sealing member.

The oxygen-scavenging means, or oxygen absorber, suitably comprises reduced iron or a polymer containing unsaturated carbon-carbon double bonds such as is disclosed in US-5,605,996, for example, but may alternatively be any of a number of other commercially available oxygen-scavenging compounds that are safe for use with food products. Another example is the Ageless® oxygen absorber from Mitsubishi Gas Chemical Inc. The oxygen scavenging means is suitably in the form of a block, tablet or a sheet that is placed within a chamber of the bottle stopper.

The oxygen scavenging means preferably has or is associated with an indicator means to indicate when the oxygen scavenging means has scavenged the oxygen within the bottle. This may be an indicator compound which changes colour, it may be embodied in a tablet separate from the oxygen scavenging means and suitably is housed within a chamber in the stopper that has a transparent wall or has a window to enable the change of appearance of the indicator means to be viewed externally. An example indicator means is the Ageless ® Eye also from Mitsubishi Gas Chemical Inc and which changes colour from blue to pink when the oxygen level in the environment within which it is stored falls to a predetermined threshold level of eg <0.01% but reverts to blue if the oxygen level rises again above a threshold level.

The indicator means and/ or the oxygen scavenging means suitably is housed within a chamber that is externally accessible. In one embodiment the chamber is accessible through removal of a screw-threaded or push/snap-fit cap that encloses and seals the chamber. In the embodiment illustrated hereinafter the indicator means suitably is housed in an uppermost chamber suitably having a cap with a window for visibility and which cap suitably is snap/push fit mounted in place. The oxygen scavenging means suitably is housed in a chamber below the indicator means and separately accessible by uncoupling an upper part of the bottle stopper body.

According to a second aspect of the present invention there is provided a bottle stopper for a wine bottle or the like, which bottle stopper comprises a body having a sealing member which sits within the neck of the bottle in use and which extends radially outwardly to seal the bottle neck, the stopper further having a passageway extending upwardly therethrough to communicate with the interior of the bottle and which incorporates or communicates with a chamber within the stopper in which is housed an oxygen-scavenging medium, wherein the oxygen scavenging means has

or is associated with an indicator means to indicate when the oxygen scavenging means has scavenged the oxygen within the bottle, the stopper having a transparent wall or a window to enable the change of appearance of the indicator means to be viewed externally by the user.

According to a third aspect of the present invention there is provided a bottle stopper for a wine bottle or the like, which bottle stopper comprises a body having a sealing member which sits within the neck of the bottle in use and which extends radially outwardly to seal the bottle neck, the stopper further having a passageway extending upwardly therethrough to communicate with the interior of the bottle and which incorporates or communicates with a chamber within the stopper in which is housed an oxygen-scavenging medium, wherein the oxygen scavenging medium is housed within a chamber that is externally accessible by a portion of the bottle stopper that is readily demountable by the user to enable the user to access and replace the oxygen scavenging medium and reclose the chamber, wherein the chamber is accessible through removal of a screw-threaded or push/snap-fit cap that encloses and seals the chamber.

Brief Description of the Drawings

A preferred embodiment of the present invention will now be more particularly described, by way of example, with reference to Figures 7 to 13 of the accompanying drawings, wherein:

Figure 1 is a side elevation view of a first novel arrangement of bottle stopper embodying the second and third aspects of the present invention mounted to the neck of a bottle in use and showing the neck of the bottle part cut away;

Figure 2 is an isometric view of the bottle stopper of Figure 1;

Figure 3 is an exploded general assembly view of the Figure 1 arrangement of bottle stopper;

Figure 4 is a longitudinal sectional view of the Figure 1 arrangement of bottle stopper;

Figure 5 is an orthogonal view of the bottle stopper of the Figure 1 arrangement of bottle stopper, protected in its cap for transport or storage;

Figure 6 is a longitudinal sectional view of the Figure 1 arrangement of bottle stopper, with cap;

Figure 7 is a view corresponding to Figure 1 but of a preferred embodiment of the bottle stopper of the first aspect of the invention wherein the bottle stopper has a deployable sealing means and in this Figure the sealing means is deployed;

Figure 8 is a side elevation view of the preferred embodiment of bottle stopper as shown in Figure 7 but with the sealing means retracted;

Figure 9 is an isometric view of the bottle stopper as shown in Figure 8;

Figure 10 is an exploded general assembly view of the Figure 7 embodiment of bottle stopper;

Figure 11 is a longitudinal sectional view through the Figure 7 embodiment of bottle stopper with the sealing means retracted;

Figure 12 is a longitudinal sectional view corresponding to Figure 11 but with the sealing means deployed; and

Figure 13 is a side elevation view of the Figure 7 embodiment of bottle stopper in retracted state and with cap fitted thereon and mounted to a wall mounting.

Description of the Preferred Embodiments

Referring firstly to Figure 1 to 6, a novel arrangement of the bottle stopper embodying the second aspect of the present invention has a body that is structured as an elastomeric sealing bung that sealingly mounts in the neck 1 of a wine bottle. The body of this bottle stopper comprises a lower, in use, portion having the form of a frustoconical rubber bung 2 that fits into and seals against the neck 1 of the bottle. Unlike most rubber bungs, which are solid, however, this lower portion 2 of the bottle stopper is tubular as can clearly be seen in Figure 3 and depends downwardly from an upper portion 3 of the bottle stopper.

Upper portion 3 of the bottle stopper functions as a handle for the bottle stopper and defines therewithin a series of chambers 4, 5 that intercommunicate with each other and via the tubular bung lower portion 2, with the atmosphere within the bottle neck 1. A lower chamber 4 of the upper part 3 of the bottle stopper houses an oxygen scavenging medium 17 to absorb/scavenge any oxygen within the atmosphere in the bottle when mounted to the neck of the bottle. The oxygen scavenging medium 17 may be in any suitable form such as a tablet or a powder

from a sachet. The oxygen scavenging medium 17 may be protected from exposure to oxygen prior to use by being sealed within a foil that is removable and which either directly encapsulates the medium 17 prior to use or which covers the opening of the tubular bung lower portion 2 to the stopper.

The upper portion 3 of the stopper is suitably a rigid plastics moulding, here formed with a domed shape, and comprising three primary components, a domed cap portion 10, a mid section 9 and a base section 8. The base section 8 is a collar shaped member that is integrally assembled to an upper end of the bung shaped lower component 2 of the stopper. Base section 8 has around its upper end an external screw thread to engage with a corresponding internal screw thread at a lower end of the interior of the mid section 9 of the upper part 3 of the stopper and a large 'O' ring washer 7 provides a seal therebetween. The mid section 9 is also generally collar shaped with a restricted diameter opening at its upper end and is at its upper end capped over by cap 10. The internal space beneath the domed cap 10 defines an uppermost chamber 5 which houses an oxygen level indicating tablet 6 and which is supported over the opening that communicates with the chamber 4 of the mid section 9 by an annular or mesh-form plate 11. If desired, plate 11 may be marked with information or logotype that is viewable through the transparent cap 10.

The cap 10 is demountable from the mid section 9, suitably being held in place by a resilient push fit/snap-fit configuration and thereby enables the oxygen level indicating tablet 6 to be replaced for repeated re-use of the bottle stopper. The domed cap 10 is transparent, or at least has a window, to enable viewing of the oxygen level indicating tablet 6 for monitoring of the oxygen level within the bottle stopper/ bottle. Change of colour of the oxygen level indicating tablet 6 demonstrates to the user that the oxygen scavenging medium 17 has performed its function and reduced the oxygen level below a desired threshold of eg 0.5% or even lower.

For storage and transport the bottle stopper of the first preferred embodiment is suitably assembled together with a lower cap 12 as shown in Figures 5 and 6. The lower cap 12 provides a symmetrical profile to the bottle stopper when encased by the lower cap 12. The lower cap 12 not only encases the bung/lower portion 2 of the stopper but also functions to close the open end of the tubular bung/lower portion 2, having an upstanding tubular column 13 therewithin that projects into the

tubular bung/lower portion 2 to seal it closed from within. The lower cap 12, furthermore, provides an interface for mounting the bottle stopper to a wall or other surface.

The lower cap 12 has a ferro-magnetic plate 14 housed within its side wall to magnetically bind the side wall of the lower cap 12 to a corresponding wall mount 15 that may be screwed in place to a wall or other surface and which accommodates a corresponding magnetic/magnetisable component 16 to which the plate 14 of the lower cap 12 magnetically binds.

Turning now to the preferred embodiment of the invention shown in Figures 7 to 13, this is more sophisticated than the stopper of Figures 1 to 6 and makes use of a deployment mechanism that is built into the bottle stopper so that the user may control the deployment of the seal on the bottle stopper for sealing engagement with the neck of the bottle. In Figure 7 the sealing members are shown as deployed.

In the embodiment, instead of a rubber bung sealing component, the bottle stopper is provided with a pair of sealing rings 30, 31 that encircle a stem of the bottle stopper that extends downwardly into the bottle neck 1. The sealing rings 30, 31 are suitably synthetic and may be elastomeric and they are configured to be deployed by being compressed longitudinally of the bottle stopper whereby they expand radially outwardly to sealingly engage the bottle neck 1.

Upper parts of the bottle stopper are substantially the same as per the first embodiment. Indeed, the cap 10 and mid section 9 of the upper part of the bottle stopper are suitably the same as the first embodiment, and with the oxygen scavenging tablet 6 being housed in the chamber 5 defined by the cap 10. The base section 8' of the upper portion 3 of the bottle stopper of this embodiment is similar to that of the first embodiment and is screw threaded to co-operatively engage with the mid section 9 but instead of serving as a mount for a bung 2, is moulded to have a downwardly depending extension/ inner plunger 21 projecting downwardly therefrom.

The inner plunger/ extension 21 is a relatively narrow circular cylindrical tube that, together with the upper parts 8', 9, 10 of the bottle stopper, may be reciprocated upwardly and downwardly relative to the top of a bottle neck 1 into which the bottle

stopper is installed in use. The inner plunger 21 has a head 21a at its lower-most end that has an entry port 40 opening into the bore of the plunger 21. Annular washers 27, 28 above and below the port 40 seal tight against the bore of a hollow shaft 33 in which the plunger 21 is slidingly mounted (Figure 11). A return spring 22 is provided encircling the inner plunger 21 to return bias it upwardly to assist in restoring the bottle stopper to its initial disengaged state. The return spring 22 is sited between an under surface 23 of the base section 8' of the upper part of the bottle stopper and an upwardly facing surface 24 of a platform component 25 of the bottle stopper that is adapted to seat at the top of the neck 1 of the bottle.

Platform component 25 is assembled of five sub-components 25a, 25b, 25c, 25d and 25e whereby the platform component 25 not only provides a sturdy platform supported by the top of the neck 1 of the bottle upper portion 3 of the bottle stopper but also has an integral releasable fastening arrangement for releasably fastening the base section 8' of the upper portion of the bottle stopper in its operative, lower-most state to the platform component 25.

Platform component 25 comprises upper 25a, middle 25b and lower 25c annular sub-components, where the lower sub-component 25c rests on the top edge of the neck 1 of the bottle. The upper sub-component 25a provides an underside shoulder 36 beneath which a pair of hooks 35 on the underside 23 of the upper portions base section 8' may latch when the stopper is being deployed (see Figures 11 and 12)..

A pair of release buttons 25c, 25d mounted on the circumference of the mid sub-component 25b of the platform component 25 are depressible radially inwardly to deflect inwardly the hooks 35 to disengage them from the should 36 when it is desired to retract the upper part of the bottle stopper for removal of the bottle stopper from the bottle. The hooks 35 are resiliently deflectable and have a tapered leading edge to facilitate their insertion into the latching part of the latching zone of the upper sub-component 25a of the platform component 25.

A rigid cylindrical sleeve 29 is fixed to the underside 23 of the base section 8' of the upper part 3' of the bottle stopper and functions as an outer cylindrical plunger the purpose of which is to impinge upon and axially compress a sealing ring 30 of the

bottle stopper to force the sealing ring 30 to radially expand into sealing engagement with the neck 1 of the bottle.

Indeed, the bottle stopper is provided with a pair of sealing rings 30, 31 spaced apart in axial sequence by a spacer ring 32. Each of the sealing rings 30, 31 comprises a ring of a synthetic sealing material such as neoprene sandwiched between a pair of washers and are held coaxially on the bottle stopper by a tubular shaft 33 which extends through the bore of each of the sealing rings 30, 31 and spacer 32 and up through the bore of the sleeve/outer plunger 29 and which threadedly engages with the upper sub-component 25a of the platform component 25. Accordingly, the shaft 33 is immovable relative to the platform component 25b. The lowermost end of the shaft 33 has a head 34 shaped like a wing nut to facilitate manipulation for screw threaded engagement or disengagement of the shaft 33 to facilitate maintenance of the sealing rings 30, 31, if desired. Such maintenance may include cleaning of the device.

An upper surface 34a of the head 34 of the shaft 33 serves as a support shoulder for supporting the lowermost sealing ring 31 such that when the bottle stopper is mounted in the neck of the bottle 1 as shown in Figure 11 and then pushed from its initial Figure 11 position to its operative Figure 12 position the outer plunger/sleeve 29 on the upper part 3' of the stopper moves downwardly through the platform component 25 pressing down on the uppermost surface of the upper sealing ring 30 and compressing the sealing ring 30 and lower sealing ring 31 downwardly against the upper support surface 34a of the head 34 of the shaft 33 that is rigidly configured relative to the platform component 25. Thus the sealing rings 30, 31 are forced to bulge radially outwardly into sealing engagement with the neck 1 of the bottle.

Simultaneously, the downward movement of the tubular inner plunger 21 within the tubular shaft 33 as the upper part 3' is moved downwardly causes the head 21a of the inner plunger 21 to emerge from sealing engagement within the bore of the shaft 33 and which thereby opens up the entry port 40 in the head 21a of the inner plunger 21. This thereby opens up a passageway from the neck 1 of the bottle into the bore of the tubular inner plunger 21 and upwardly through the bottle stopper into the chamber 4 of the cap 10 of the bottle stopper whereby the oxygen scavenging medium 17 is directly communicated with the atmosphere in the neck 1 of the bottle

to scavenge any oxygen present therein. Furthermore as the air reaches the upper chamber 5 the oxygen level indicating tablet 6 will be responsive to the change in oxygen level in the bottle effected by the oxygen scavenging medium 17.

Thus it is will be seen that the pushing down on the upper part 3' of the bottle stopper when the bottle stopper is mounted in place in the neck 1 of the bottle performs two functions. It not only deploys the sealing rings 30, 31 into sealing engagement with the neck 1 of the bottle, but also opens up a passageway through to the oxygen scavenging medium 17 for the medium 17 to start working to remove oxygen from within the bottle. The oxygen scavenging medium 17 is, therefore, once installed in the chamber 5 of the cap 10 of the bottle stopper, only exposed to atmosphere when the bottle stopper is in place and, thus, only exposed to the atmosphere within the bottle.

As with the embodiment of Figure 1, the embodiment of Figure 7 may also be provided with a bottom cap 12' (see Figure 13). Here the bottom cap 12' again serves as a means of mounting the bottle stopper to a wall or other surface using a magnetic wall mount 15 but there is no requirement for the end cap 12' to be configured to seal the passageway of the bottle stopper since the bottle stopper has its own integral passageway closure system.